

Investigation of Dissolution in Diammonium Hydrogen Phosphate Solutions of Gypsum

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Abstract : Gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) is a mineral that is found in large quantities in the Turkey and in the World. The dissolution of this mineral in the diammonium hydrogen phosphate solutions has not been studied so far. Investigation of the dissolution and dissolution kinetics gypsum in diammonium hydrogen phosphate solutions will be useful for evaluating of solid wastes containing gypsum. In this study, parameters such as diammonium hydrogen phosphate concentration, temperature and stirring speed affecting on the dissolution rate of the gypsum in diammonium hydrogen phosphate solutions were investigated. In experimental studies have researched effectiveness of the selected parameters. The dissolution of gypsum were examined in two parts at low and high temperatures. The experimental results were successfully correlated by linear regression using Statistica program. Dissolution curves were evaluated shrinking core models for solid-fluid systems. The activation energy was found to be 34.58 kJ/mol and 44.45 kJ/mol for the low and the high temperatures. The dissolution of gypsum was controlled by chemical reaction both low temperatures and high temperatures. Reaction rate expressions of dissolution of gypsum at the low temperatures and the high temperatures controlled by chemical reaction are as follows, respectively. $= k_1 \cdot e^{-5159.5/T} \cdot t = k_2 \cdot e^{-5346.8/T} \cdot t$ Where k_1 and k_2 are constants depending on the diammonium hydrogen phosphate solution concentration, the solid/liquid ratio, the stirring speed and the particle size.

Keywords : diammonium hydrogen phosphate, dissolution kinetics, gypsum, kinetics.

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